Historic, Archive Document

Do not assume content reflects current
scientific knowledge, policies, or practices.

USDA United States Department of Agriculture

Natural Resources Conservation Service

D 224 I2I33 (copy 2)

Idaho Basin Outlook Report November 1, 1998

Basin Outlook Reports
and
Federal - State - Private
Cooperative Snow Surveys

For more water supply and resource management information, contact:

Your local Natural Resources Conservation Service Office
or
Natural Resources Conservation Service
Snow Surveys
9173 West Barnes Drive, Suite C
Boise, ID 83709-1754
(208) 378-5740

How forecasts are made

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snowcourses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in computerized statistical and simulation models to prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertain the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

The United States Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, or marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, D.C., 20250-9410, or call (202) 720-5964 (voice and TDD). USDA is an equal employment opportunity provider and employer.

DAHO WATER SUPPLY OUTLOOK REPORT

NOVEMBER 1, 1998

INTRODUCTION

The Natural Resources Conservation Service has compiled this special issue of the Idaho Water Supply Outlook Report to provide water users with information on current conditions and developing La Nina type conditions. It also includes a historic comparison of other La Nina years and Internet addresses, which water users can access to find more information.

Contents

SUMMARY

In general, the winter weather forecast for the Pacific Northwest is for wetter and cooler conditions as a result of developing La Nina-type conditions. Exceptions do occur, however. The last La Nina year was in 1989 when the snowpack was near normal but streamflows were *below* normal.

Analysis of historic data during La Nina-type years in Idaho demonstrates that some of the record high snowpacks and streamflows, and in come cases streamflow peaks, occurred during these years. Analysis by the Western Regional Climate Center (WRCC) shows that the chance of receiving consecutive days of precipitation is greater in northern Idaho and western Montana during La Nina-type winters. Winter floods in Idaho are often the result of ice jams, rain-on-snow events, and/or rapid melting of an above normal low and mid-elevation snowpack.

La Nina is no guarantee that flood events or wetter conditions will occur. However, analysis shows that the chances of receiving above normal precipitation and snowfall are greater during La Nina-type years. Or as stated by the National Weather Service (NWS) on their Internet page, "statistics simply say the odds are better for a cooler and wetter winter." Other La Nina characteristics summarized by NWS include extremely cold temperatures followed by warm events (in a single season). In the past, this combination has triggered significant ice jam floods statewide. There is less correlation with spring snowmelt flooding and above average snowpacks.

Use this data with caution, since it is based on only a few events.

What can Idahoans do to prepare for a possibly wetter and colder winter? Clean ditches, storm drains, and gutters on homes. Place emergency supplies in vehicles.

Request for Feedback

This is the first year NRCS has written a Fall Summary Outlook Report. If you find the information in this report useful and would like to see this type of report published in future years, please let us know. Contact us by phone, fax, e-mail, or regular mail with your comments and a statement how you may use this type of information.

Address: Natural Resources Conservation Service
9173 W. Barnes Drive, Suite C
Boise, ID 83709-1574

Ron Abramovich
Phone: (208) 378-5741
FAX: (208) 378-5735
e-mail: rabramo@id.nrcs.usda.gov

Additional information is available on the Snow Survey Internet page, along with related links to other cooperator's pages: **http://idsnow.id.nrcs.usda.gov/**

GENERAL CONDITIONS

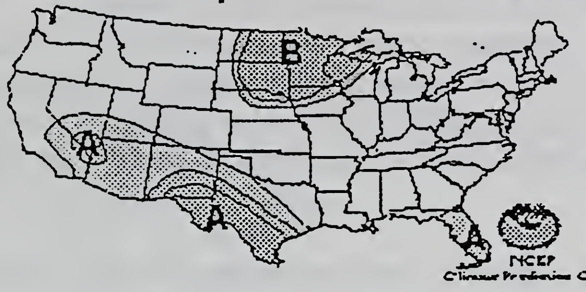
In general, reservoir carryover storage is above average throughout southern Idaho. The Southern Oscillation Index (SOI) is indicating a La Nina type year. Climatological forecasts by the National Weather Service call for above normal precipitation and normal temperatures across the Pacific Northwest for November. The November-January climatological forecast is for normal temperatures and above normal precipitation for the northern two-thirds of Idaho (see Climate Outlook Maps). Last year's April 1 streamflow forecasts (Most Probable Volumes, 50% Chance of Exceeding) were below the actual volumes due to the well above normal precipitation received in May and June.

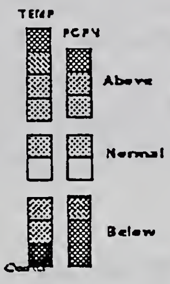
SNOWPACK

No snow yet, but stay tuned ..... On average most Idaho SNOTEL measuring stations start accumulating snow around November 1. *Average November 1 snow water content* in Idaho ranges from zero to five inches.

November 98

Temperature

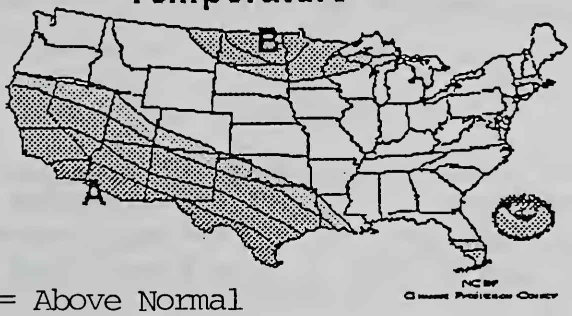




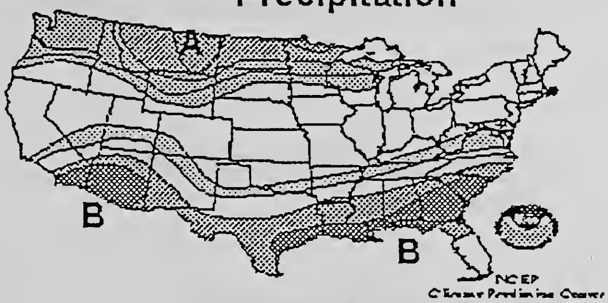
Precipitation

Nov-Dec-Jan 99

Temperature



Precipitation



A = Above Normal
B = Below Normal

Release Date: October 16, 1998

Climate Outlook

The key below is used to interpret each of the color versions of the *Climate Outlook* products. In areas where confidence in predictive skill has been established, the probabilities of the above normal, near normal or below normal categories are increased accordingly above the climatology level of 1/3 for each category. These probabilities are contoured at intervals using colors as depicted in the key below.
In those areas where the skill of our present prediction tools is not sufficient, the default is climatology (white color). The probabilities of experiencing each of the three categories (above normal, near normal or below normal) remain equally likely (1/3) in the white areas on attached maps.

Precip	Temp	Probability anomaly as shown on map	Probability of occurrence for each class A	N	B	Most likely category
		40%-50%	73.3%-83.3%	23.3%-13.3%	3.3%	"Above"
		30%-40%	63.3%-73.3%	33.3-23.3%	3.3%	"Above"
		20%-30%	53.3-63.3%	33.3%	13.3%-3.3%	"Above"
		10%-20%	43.3-53.3%	33.3%	18.3%-28.3%	"Above"
		5%-10%	38.3-43.3%	33.3%	28.3%-23.3%	"Above"
		0%-5%	33.3-38.3%	33.3%	28.3%-33.3%	"Above"
		0%-5%	30.8%-33.3%	33.3%	30.8%-33.3%	"Near Normal"
		5%-10%	28.3%-30.8%	33.3%	28%.3-30.8%	"Near Normal"
		0%-5%	28.3%-33.33%	33.3%	33.3%-38.3%	"Below"
		5%-10%	23.3%-28.3%	33.3%	38.3%-43.3%	"Below"
		10%-20%	28.3%-18.3%	33.3%	43.3%-53.3%	"Below"
		20%-30%	13.3%-3.3%	33.3%	53.3-63.3%	"Below"
		30%-40%	3.3%	33.3%-23.3%	63.3%-73.3%	"Below"
		40%-50%	3.3%	23.3%-13.3%	73.3%-83.3%	"Below"
		0%	33.3%	33.3%	33.3%	"Climatology"

PRECIPITATION SUMMARY

A wet spring and early summer improved mountain precipitation from below normal levels at the end of April to normal or slightly above normal levels for basins south of the Clearwater basin. Monthly precipitation was above normal in May, June and July for all basins expect the Panhandle Region. August turned dry and hot with most mountain areas receiving 10-30% of normal amounts except in the Bear and Upper Snake basins which received 75 and 115% of average respectively. September precipitation was varied and ranged from 88% of average in the Panhandle Region to 126% of average in the west central mountains.

Water year 1999 started October 1; thus far precipitation is below normal, ranging from 30-80% of average across the state. Similarly, precipitation in October 1988, which preceded the last La Nina year, was also well below normal. However, by January 1989, snowpacks ranged from 80-150% of average across the state.

Water Year 1998 Precipitation

Region / Basin	*Precipitation as Percent of Average for Oct. 1, 1997 - April 30, 1998*	*Precipitation as Percent of Average for Oct. 1, 1997 - Sept. 30, 1998*
PANHANDLE REGION	83	87
CLEARWATER	80	88
SALMON	91	104
WEISER, PAYETTE & BOISE	93	108
WOOD & LOST	90	112
UPPER SNAKE RIVER	89	100
SOUTHSIDE SNAKE RIVER	93	116
BEAR RIVER	95	108

RESERVOIR CARRYOVER STORAGE

Reservoir carryover storage is above average across the state except for Dworshak Reservoir which is 81% of average. This carryover will help provide an adequate water supply for next year. However, reservoir releases may be required if a wet winter and above normal snowpack materializes. Following is a Basin Wide Reservoir Summary for the end of October 1998 summarizing reservoir storage as a percent of capacity, average and last year.

Note: NRCS reports reservoir information in terms of usable volumes, which includes both active, inactive, and in some cases dead storage. Other operators may report reservoir contents in different terms. For additional information, see the reservoir definitions in the back of this report.

FALL STREAMFLOW CONDITIONS

Fall streamflows were below normal in the Panhandle Region and Clearwater basin in September and October. Elsewhere, late summer and early fall baseflows were still near or above normal indicating that springs, soil moisture and groundwater sources are still providing good baseflows as a result of the past four years of normal or above normal snowpacks and precipitation. Many springs have been recharged and are flowing at the highest levels in years.

BARE - DATA CURRENT AS OF:11/04/98 13:08:03

BASIN WIDE
RESERVOIR SUMMARY

FOR THE END OF OCTOBER 1998

BASIN AREA RESERVOIR	CURRENT AS % CAPACITY	LAST YR AS % CAPACITY	AVERAGE AS % CAPACITY	CURRENT AS % AVERAGE	CURRENT AS % LAST YR
PANHANDLE REGION					
PEND OREILLE	60	61	63	95	98
COEUR D'ALENE	54	56	66	82	97
PRIEST LAKE	63	31	67	93	203
TOTAL OF 3 RESERVOIRS	59	58	64	93	102
CLEARWATER RIVER BASIN					
DWORSHAK	64	58	78	81	110
TOTAL OF 1 RESERVOIRS	64	58	78	81	110
BOISE RIVER BASIN					
ANDERSON RANCH	83	91	71	117	91
ARROWROCK	32	29	28	113	112
LUCKY PEAK	35	39	26	136	90
TOTAL OF 3 RESERVOIRS	55	59	46	119	93
WEISER, PAYETTE, BOISE RIVER BASINS					
MANN CREEK	11	8	22	50	133
CASCADE	74	80	59	126	92
DEADWOOD	74	76	39	192	97
ANDERSON RANCH	83	91	71	117	91
ARROWROCK	32	29	28	113	112
LUCKY PEAK	35	39	26	136	90
LAKE LOWELL (DEER FLAT)	62	67	59	105	94
TOTAL OF 7 RESERVOIRS	63	68	51	124	93
WOOD AND LOST RIVER BASINS					
MAGIC	58	66	36	161	87
LITTLE WOOD	45	45	27	168	100
MACKAY	44	39	31	143	114
TOTAL OF 3 RESERVOIRS	54	59	34	159	91
UPPER SNAKE RIVER BASIN					
HENRYS LAKE	94	99	82	115	95
ISLAND PARK	86	89	50	173	96
GRASSY LAKE	80	55	64	125	146
JACKSON LAKE	68	76	53	126	88
PALISADES	83	94	69	119	88
RIRIE	51	51	41	125	100
BLACKFOOT	67	77	61	111	88
AMERICAN FALLS	62	53	35	175	115
TOTAL OF 8 RESERVOIRS	71	74	52	135	96
SOUTHSIDE SNAKE RIVER BASINS					
OAKLEY	47	46	24	195	104
SALMON FALLS	40	38	23	172	106
WILDHORSE RESERVOIR	73	75	41	179	98
OWYHEE			NO REPORT		
BROWNLEE			NO REPORT		
TOTAL OF 3 RESERVOIRS	49	48	27	179	103
BEAR RIVER BASIN					
BEAR LAKE	87	84	71	121	103
MONTPELIER CREEK	55	85	40	138	65
TOTAL OF 2 RESERVOIRS	86	84	71	121	103

WHAT'S NEW IN THE SNOW SURVEY PROGRAM ? !

- ***Starting in January 1999, NRCS will provide end-of-month reservoir storage forecasts in acre-feet for Oakley and Salmon Falls reservoirs.*** These forecasts are based on statistical regression equations and have a good correlation with reservoir storage several months in advance. Due to the unique nature of these two reservoirs (i.e., little release of water during the winter months) and with the availability of timely streamflow data for Salmon Falls Creek, this type of forecasting is possible.

- ***NRCS added about 25 National Weather Service stations to their list of stations obtained from the NWS.*** The monthly precipitation data will be posted as it becomes available along with the SNOTEL and NWS precipitation data currently posted on our Internet page. The stations added are in numerous cities and towns across Idaho.

- ***NRCS installed snow depth sensors at Mores Creek Summit (north of Idaho City) and South Mountain (in Owyhee Basin) SNOTEL sites.*** There are currently seven ultrasonic depth sensors in the Idaho area reporting snow depth in inches. These sensors will be valuable in monitoring depth of snow on the ground, new snowfall amounts, and in determining densities of the snowpack to monitor when melting may start. Winter recreationist will also find this information useful. The Mores Creek depth sensor is located 16.5 feet above the ground. The maximum snow depth ever measured at this site was 11.2 feet on April 1, 1943. Plans are to install additional snow depth sensors in the Boise and Clearwater basins in the summer of 1999.

- ***Daily SNOTEL Update Report -- Oakley and Salmon Falls basins are now*** **separate** in this report in response to requests by users in these basins.

- ***In September, NRCS installed a new SNOTEL site in Wyoming called Gunsight Pass.*** It is located at 9,800 feet in elevation near the tri-basin divide of the Green, Snake and Wind river basins. This site will monitor conditions in a high elevation and geographic area not currently represented with the existing SNOTEL Data Collection Network. It will provide valuable information for improved streamflow forecasting, high elevation snowpack information, winter recreation activities, and local water management issues. The site was installed with the standard SNOTEL sensors (snow water content, precipitation, and air temperature). A snow depth sensor was also installed and will provide winter recreationists and other users with daily snow depth information. Solar radiation, wind speed and direction, and relative humidity sensors were also installed in conjunction with a climatic and glaciology study by the US Geological Survey of the receding glaciers in the Green River area.

LA NINA - EL NINO - SOUTHERN OSCILLATION INDEX INFORMATION

This section includes information about La Nina, El Nino and Southern Oscillation Index (SOI) and how this information is being analyzed and used in streamflow forecasting.

Included in this section is:

- **Classification of El Nino and La Nina Winters**
- **Current Southern Oscillation Index Values**
- **Precipitation and Streamflow Diagrams Illustrating SOI Correlations in the Central Idaho Mountains and** *Noteworthy Information*
- **Idaho Snowpack & Streamflow Summary Table for La Nina Years and** *Noteworthy Information*
- **La Nina Information Summary from the National Weather Service**
- **Early Seasonal Streamflow Volume Forecasts for 1999**

    - Explanation on how SOI is Used in Streamflow Forecasting
    - Map of SOI Correlation with Spring / Summer Streamflow Volumes

---

Classification of El Nino and La Nina Winters

The following analysis by the Western Regional Climate Center (WRCC) is included to help readers understand the yearly classification of El Nino and La Nina years. Several different classification and standards are being used and developed to classify El Nino and La Nina type years. Following the methodology of Redmond and Koch, Water Resources Research, 1991, the best relationships in the Western US are found between summer/autumn SOI and the following winter climate and the following spring and summer streamflow runoff. NRCS used this SOI classification to determine La Nina type years for this report.

The following information is provided by the Western Regional Climate Center Internet Web page.
http://www.wrcc.sage.dri.edu/

A number of WRCC ENSO tables and graphs are stratified by June-November Southern Oscillation Index (SOI) following the logic of Redmond & Koch (1991, 2381-2399, Water Resources Research). Slightly better relations are found between western climate and SOI than with SST (Sea Surface Temperatures). Also, better relations are often found when SOI leads winter climate (by about 4 months) rather than being concurrent with climate. And, whether better, similar, or even slightly worse, the predictive utility is retained with the earlier SOI period. Because the SOI is averaged over 6 months, the lead and lag periods are not completely separated (2-month overlap for Oct-Mar climate elements), but by early winter (Sept or Oct) the "ball park" value of the SOI is usually apparent.

Strictly speaking, with this approach ENSO phase is determined by atmospheric quantities (SOI). El Nino and La Nina are usually defined solely by ocean temperatures (SST). The relationship between the two is strong enough that most moderately positive SOI years are also La Nina and most moderately negative SOI years are also El Nino. The terms are used interchangeably, at some risk of misinterpretation, to denote ENSO phase.

SE - Strongly Negative SOI (-1.00 or less) - "Stronger El Nino"
EN - Mildly Negative SOI (-0.50 or less) - "Moderate El Nino"
N - Neither (SOI between -0.50 and +0.50) - "Neither Nino" or "Nada Nino"
LN - Mildly Positive SOI (+0.50 or more) - "Moderate La Nina"
SL - Strongly Positive SOI (+1.00 or more) - "Stronger La Nina"

Unless stated otherwise, the term "El Nino" based on SOI usually includes EN and SE cases.
Unless stated otherwise, the term "La Nina" based on SOI usually includes LN and SL cases.

Year	Jun-Nov Ave SOI	Following Winter	Label -- -- - -- --
1933	0.13	1933-34	N
1934	-0.05	1934-35	N
1935	0.18	1935-36	N
1936	-0.42	1936-37	N
1937	-0.23	1937-38	N
1938	1.20	1938-39	SL
1939	-0.58	1939-40	EN
1940	-1.80	1940-41	SE
1941	-1.73	1941-42	SE
1942	0.28	1942-43	N
1943	0.22	1943-44	N
1944	-0.52	1944-45	EN
1945	0.45	1945-46	LN
1946	-1.05	1946-47	SE
1947	0.52	1947-48	LN
1948	-0.25	1948-49	N
1949	-0.43	1949-50	N
1950	1.55	1950-51	SL
1951	-1.07	1951-52	SE
1952	0.05	1952-53	N
1953	-0.75	1953-54	EN
1954	0.18	1954-55	N
1955	1.50	1955-56	SL
1956	0.88	1956-57	LN
1957	-0.62	1957-58	EN
1958	-0.12	1958-59	N
1959	-0.18	1959-60	N
1960	0.27	1960-61	N
1961	-0.12	1961-62	N
1962	0.38	1962-63	N
1963	-0.92	1963-64	EN
1964	0.87	1964-65	LN
1965	-1.58	1965-66	SE
1966	-0.08	1966-67	N
1967	0.10	1967-68	N
1968	0.15	1968-69	N
1969	-0.67	1969-70	EN
1970	0.77	1970-71	LN
1971	0.92	1971-72	LN
1972	-1.28	1972-73	SE
1973	1.28	1973-74	SL
1974	0.55	1974-75	LN
1975	1.83	1975-76	SL
1976	-0.52	1976-77	EN
1977	-1.52	1977-78	SE
1978	0.00	1978-79	N
1979	0.05	1979-80	N
1980	-0.38	1980-81	N
1981	0.42	1981-82	N
1982	-2.42	1982-83	SE
1983	-0.12	1983-84	N
1984	-0.22	1984-85	N
1985	-0.37	1985-86	N
1986	-0.22	1986-87	N
1987	-1.35	1987-88	SE
1988	1.25	1988-89	SL
1989	0.22	1989-90	N
1990	-0.23	1990-91	N
1991	-0.95	1991-92	EN
1992	-0.80	1992-93	EN
1993	-1.08	1993-94	SE
1994	-1.43	1994-95	SE
1995	0.00	1995-96	N
1996	0.47	1996-97	N
1997	-1.67	1997-98	SE
1998	+????	1998-99	

Current Southern Oscillation Index Values

The standardized SOI for the past several months (Summer 1998) is:

June	July	August	September	October	November
0.7	1.3	1.0	1.2	???	???

Based on the June-October SOI, the average SOI for this period is 1.05

The SOI months that correlate best with spring/summer runoff in Idaho vary from drainage to drainage but range from June-December with June-September producing the best correlating months. NRCS has used SOI as a forecasting variable since 1990 in several northern Idaho streamflow equations.

The two diagrams on the next page from the WRCC illustrate the correlation with SOI and:

- Central Idaho Mtns Div 4 October-March Precipitation, and
- North Fork Clearwater River Flow into Dworshak Reservoir for the April-July Period.

The darker plotted points on the right-hand side of the graphs are La Nina years and illustrate the greater precipitation and runoff volumes during these years.

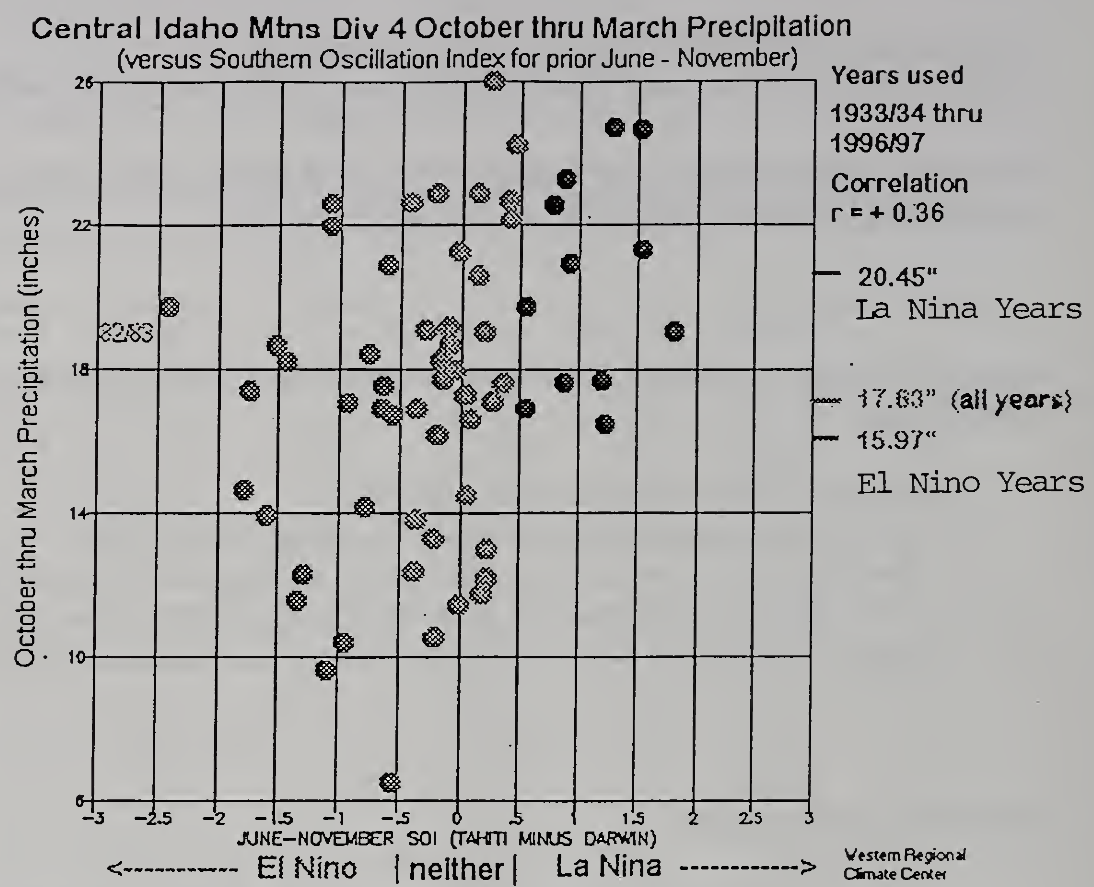
Important points to consider from these diagrams and other diagrams on their WRCC Internet page:

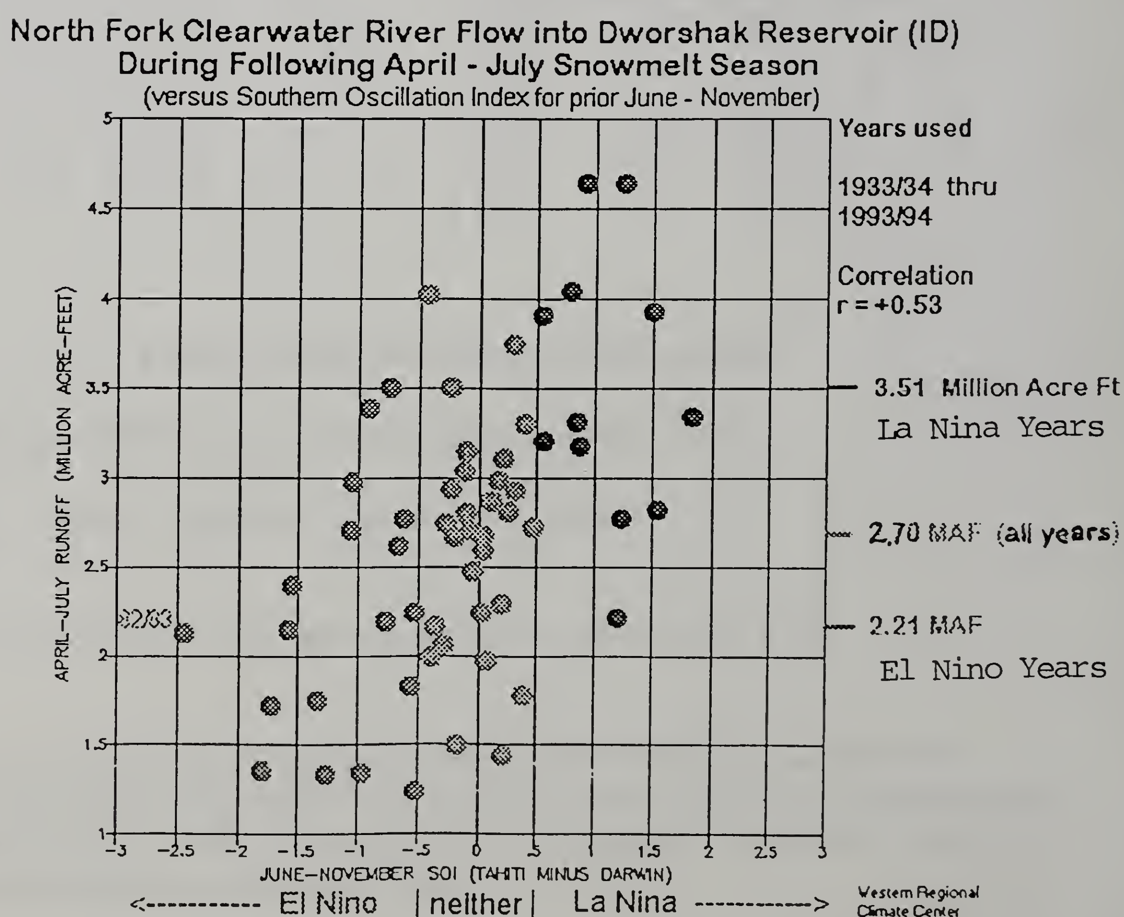
- Not every El Nino produces the same effect.
- La Nina has a more consistent signal, in general, than El Nino.
- The relations are not perfect....other things are happening in the climate system.
- The 1982/83 El Nino does not fit in with the other points in some locations.
- Patterns for large El Ninos may differ in some ways from typical El Nino patterns.

Noteworthy information:

- In the North Fork Clearwater River, five of the seven highest April-July streamflow volumes occurred during La Nina type years.

- Since 1955, six of the ten highest April-July streamflow volumes in the Boise River occurred during La Nina years.


Central Idaho Mtns Div 4 October thru March Precipitation
(versus Southern Oscillation Index for prior June - November)
October thru March Precipitation (inches)
26
22
18
14
10
6
82/83
-3 -2.5 -2 -1.5 -1 -.5 0 .5 1 1.5 2 2.5 3
JUNE–NOVEMBER SOI (TAHITI MINUS DARWIN)
<----------- El Nino | neither | La Nina ----------->
Years used
1933/34 thru 1996/97
Correlation r = + 0.36
20.45" La Nina Years
17.63" (all years)
15.97" El Nino Years
Western Regional Climate Center


North Fork Clearwater River Flow into Dworshak Reservoir (ID)
During Following April - July Snowmelt Season
(versus Southern Oscillation Index for prior June - November)
APRIL–JULY RUNOFF (MILLION ACRE–FEET)
5
4.5
4
3.5
3
2.5
2
1.5
1
82/83
-3 -2.5 -2 -1.5 -1 -.5 0 .5 1 1.5 2 2.5 3
JUNE–NOVEMBER SOI (TAHITI MINUS DARWIN)
<----------- El Nino | neither | La Nina ----------->
Years used
1933/34 thru 1993/94
Correlation r = +0.53
3.51 Million Acre Ft La Nina Years
2.70 MAF (all years)
2.21 MAF El Nino Years
Western Regional Climate Center

Idaho Snowpack and Streamflow Summary Table for La Nina Years

The following table summarizes the April 1 snowpack as a percent of average and the April-July streamflow as a percent of average for several basins across the state. Not all basins are included, but users can obtain a general indication on how adjacent basins responded during these La Nina type years.

Noteworthy information from this analysis:

- In nearly all years the April 1 snowpack was average or well above average for all basins.

- These 9 La Nina years produced normal to above normal streamflow in the St. Joe and Clearwater basins, ranging from 101 to 174% of average.

- Several of the northern Idaho basins set their record high snow water equivalent levels and runoff volumes during La Nina years.

- The average April 1 snowpack and average April-July runoff for La Nina years ranges from approximately 120-140% of average for these basins.

- Only in 1989 was the runoff below normal for most of the state; in fact runoff was much below average in the Big Lost River at 38% of average and 65% in the Big Wood River basin. This may also be a result of below normal spring precipitation (April-June) that was 40-60% of average across southern Idaho and about 90% in northern Idaho, *and that this year followed two below normal snowpack and runoff years*. The other La Nina years generally followed one or more wet years (similar to conditions of this coming year).

IDAHO Snowpack & Streamflow Summary for La Nina Years

SWE = Snow Water Equivalent for April 1 as Percent of Average

Strm = Streamflow - Percent of Average Runoff for April-July, except for Goose Creek which is March-July and Owyhee River which is February-July.

Water Year / La Nina Classification (LN = Mildly Positive SOI "Moderate La Nina") (SL = Strongly Positive SOI "Stronger La Nina")

River / Basin Location	1989 / SL SWE 1-Apr	1989 / SL Strm Apr-Jul	1976 / SL SWE 1-Apr	1976 / SL Strm Apr-Jul	1975 / LN SWE 1-Apr	1975 / LN Strm Apr-Jul	1974 / SL SWE 1-Apr	1974 / SL Strm Apr-Jul	1972 / LN SWE 1-Apr	1972 / LN Strm Apr-Jul	1971 / LN SWE 1-Apr	1971 / LN Strm Apr-Jul	1965 / LN SWE 1-Apr	1965 / LN Strm Apr-Jul	1957 / LN SWE 1-Apr	1957 / LN Strm Apr-Jul	1956 / SL SWE 1-Apr	1956 / SL Strm Apr-Jul	La Nina Average SWE 1-Apr	La Nina Average Strm Apr-Jul
St Joe (at Calder)	**102**	**101**	**122**	**123**	**135**	**108**	**179** *	**169**	**157**	**152**	**126**	**147**	**137**	**120**	NA	**119**	NA	**153**	**137**	**132**
Clearwater (Dworshak Reservoir Inflow)	**106**	**102**	**126**	**125**	**125**	**119**	**152**	**173**	**168** *	**174** *	**134**	**150**	**131**	**123**	NA	**118**	NA	**145**	**135**	**137**
Salmon (at White Bird)	**101**	74	**115**	**130**	**125**	**124**	**161** *	**159**	**136**	**124**	**152**	**160** *	**147**	**156**	NA	**123**	NA	**146**	**134**	**133**
Boise (near Boise)	**107**	83	**112**	**105**	**130**	**138**	**164** *	**165**	**153**	**149**	**156**	**174**	**164** *	**182** *	NA	**125**	NA	**157**	**141**	**142**
Big Wood (Magic Reservoir Inflow)	**108**	65	**104**	83	**123**	**143**	**159**	**161**	**135**	97	**155**	**205**	**161** *	**216**	NA	**103**	NA	**165**	**135**	**138**
Big Lost (Mackay Reservoir Inflow)	**107**	38	95	95	**108**	**134**	**164**	**148**	**120**	96	**155**	**133**	**184** *	**178** *	**103**	**102**	NA	**130**	**130**	**117**
Snake (near Heise)	**109**	96	**135**	**124**	**106**	**109**	**133**	**141**	**141**	**132**	**153**	**154**	**142**	**129**	**108**	**108**	**128**	**141**	**128**	**126**
Goose (Oakley Reservoir Inflow Mar-Jul)	**117**	76	**123**	**123**	**134**	**193**	**157**	**142**	**182**	**159**	**132**	**157**	**120**	**106**	98	98	**114**	91	**131**	**127**
Owyhee (near Rome Feb-Jul period)	**138**	**139**	**132**	**101**	NA	**169**	**104**	**125**	**113**	**169**	**120**	**128**	**114**	99	NA	**130**	NA	94	**120**	**128**

A * below a number means it is the record high value for that month or period.

Bold values are all above 100% of average.

NA = Not Available

Non-bold values are less than 100% of average.

The following information is from the Boise National Weather Service Internet page.

Additional information and links are available on this page.
http://www.boi.noaa.gov/New/lanina.html

La Nina (El Viejo)

The following links (on the above Internet page) provide information on the La Nina event that is apparently unfolding in the wake of El Nino in the Pacific Ocean. Please keep in mind:

- La Nina events are less frequent than El Nino events. Thus, predictions of effects on the continental United States are based on fewer events and are more uncertain.

- La Nina (and El Nino) are climatological events affecting the average conditions across the United States and are NOT associated with individual storm systems. La Nina DOES affect the track of storm systems by altering the steering currents in the upper atmosphere (jet-stream).

- The most noticeable effects on the US climate occur in the late fall, winter, and early spring seasons.

- Effects on Idaho (or the rest of the United States) are uncertain. Most La Nina events result in somewhat wetter winters across the Pacific Northwest, but a La Nina event is no guarantee of these results. Some La Nina years have produced average winters or even drier than normal conditions. Statistics simply say "the odds are better for a cooler and wetter winter."

- Snowpack data from La Nina years in the 1950s and 1970s show snowpacks trending well above normal for most of the state. The La Nina years of 1971 and 1974 had record setting snowpacks by January 1st. This supports much above normal snowfall, especially early in the season. Other La Nina characteristics include extremely cold temperatures followed by warm events (in a single season). In the past, this combination has triggered significant ice jam floods statewide. There is less correlation with spring snowmelt flooding and the above average snowpacks. The 1974 La Nina year did result in record runoff from some sites in the central mountains.

- Use caution when using this data, since it is based on only a few events.

Early Seasonal Streamflow Volume Forecasts Based on the El Nino / Southern Oscillation

Early streamflow forecasts in certain areas for next spring and summer are possible based on knowledge of La Nina and El Nino / Southern Oscillation (ENSO). Since this phenomenon can have major impacts on weather patterns in the western United States (and elsewhere), it is prudent to be prepared as far in advance as possible for its likely climatological and hydrological impacts.

The ENSO is a coupled ocean-atmosphere phenomenon, each component receiving feedback from, and influencing, the other. The El Nino is the oceanic component in which the sea surface temperatures are warmer than average in the eastern Pacific. Its counterpart, where sea surface temperatures are colder than average, is called La Nina. The Southern Oscillation is the associated atmospheric component in which higher and lower than average barometric pressures swing back and forth between the far western Pacific and locations to the east in the south Pacific.

In the western US, the typical pattern during an El Nino year is for the weather to be wetter and cooler than average in the Southwest (southern California, Arizona, New Mexico) and drier and warmer than average in the Northwest (Washington, Oregon, Idaho, Montana, Wyoming). The opposite is true for a La Nina year. A transition zone through northern California, Nevada, Utah, and Colorado exists in which the weather is not affected in a consistent way by the ENSO. There is also no significant ENSO signal in Alaska. **Following is map, by the NRCS National Water & Climate Center, illustrating the correlation of SOI and spring/summer runoff volumes in the Western US.**

A convenient index to the ENSO is the Southern Oscillation Index (SOI). This index measures the barometric pressure difference between Darwin, Australia and Tahiti and indicates the status of the atmospheric component of the ENSO. Several studies have found modest but significant statistical relationships between the SOI and precipitation, temperature, and streamflow in the West. Of particular importance in forecasting, the signal from the SOI precedes the effects in the western US by up to 6 months, giving forecasters the opportunity to utilize this information well in advance of the traditional start of the streamflow forecasting season in January (in many cases as early as October and November).

Although long-lead weather forecasts are now available that extend a year ahead, these are not yet presented in a form that can be easily used quantitatively in a streamflow forecast. In addition, a few studies have indicated that the skill of these weather forecasts in some regions of the West requires improvement before they can provide adequate information upon which to base a streamflow forecast. Through some preliminary investigations, the NWCC has determined that better streamflow forecasting results can be obtained by using indices such as the SOI directly in statistical models rather than trying to process the long-lead weather forecasts so that they can be used as model input.

These early season streamflow forecasts in this report are based primarily on the SOI. The skill of these forecasts, as reflected in the spread of values for the various exceedance probabilities, is modest when compared with that of traditional forecasts based on snow measurements. Nevertheless, these SOI-based forecasts do contain valuable information, made all the more important by how early in the season they can be produced. As with all streamflow forecasts, these must be viewed not as single values, but as a range of values, each with a specific probability of occurrence, and the spread of the values will diminish with each new forecast as the winter progresses. For operational decisions, users should select forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected.

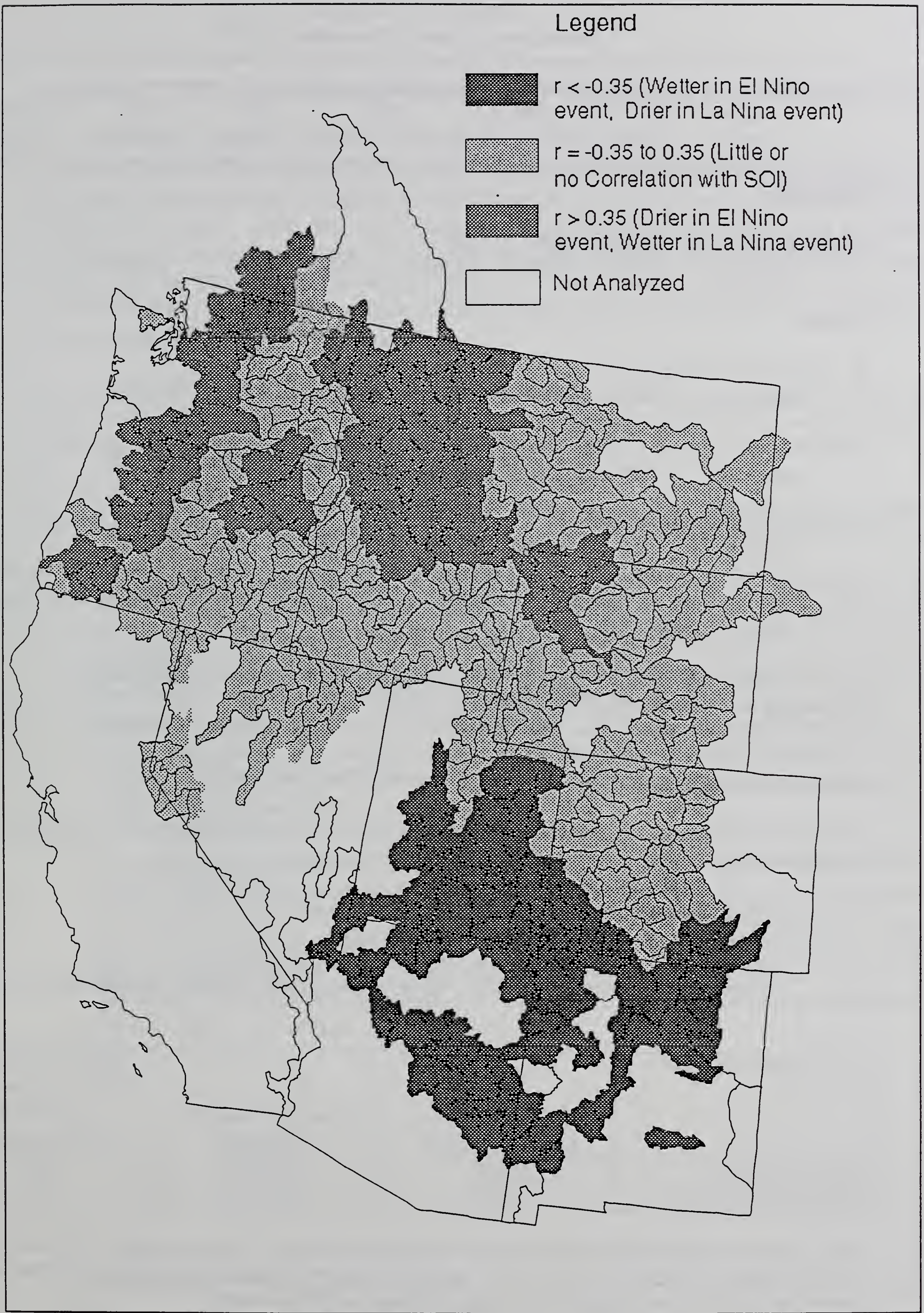


Figure 1. Correlation of the Southern Oscillation Index (SOI) with spring and summer volume runoff

IDAHO / WYOMING
Streamflow Forecasts - November 1, 1998

Forecast Pt / Forecast Period	90% (1000AF)	70% (1000AF)	50% (1000AF)	50% (% AVG)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
WYOMING							
SNAKE River above Palisades nr Alpine, WY(2)							
APR-JUL	1672	2423	2764	120%	3105	3856	2311
IDAHO							
ST. JOE River at Calder, ID							
APR-JUL	888	1250	1414	121%	1578	1940	1169
NORTH FORK CLEARWATER River (Dworshak Resv. Inflow) ID (2)							
APR-JUL	2137	3000	3400	127%	3795	4663	2687
SALMON River at Salmon, ID							
APR-JUL	509	864	1025	118%	1186	1541	869

Chance of Exceeding *

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

(2) - The value is natural flow - actual flow may be affected by upstream water management.
The average is computed for the 1961-1990 base period.

OAKLEY AND SALMON FALLS RESERVOIR ANALYSIS FOR 1999

NRCS recently compiled spreadsheets to assist in the analysis of these two southern Idaho reservoirs. The spreadsheets project the end of month reservoir storage by assuming:

- average change in reservoir storage in November-December
- average streamflow inflow in January and February
- average distribution of runoff during the runoff season, March-July
- average monthly losses, January-July, which includes irrigation demand, seepage and evaporation

As of October 31, 1998	Oct. 31 Reservoir Storage (acre-feet)	Capacity of Reservoir (acre-feet)	March-July Runoff Volume Needed to Fill Reservoir (% of average)
Oakley Reservoir	36,600	474,500	158
Salmon Falls Reservoir	73,800	182,650	172

*Note: Reservoir releases from Oakley Reservoir this fall will change the above analysis. The above 'Runoff Volumes Needed To Fill Reservoirs' **<u>are not streamflow forecasts for next year</u>**. It is the volume needed to the fill reservoirs based on average conditions mentioned above.*

REVIEW OF THE 1998 STREAMFLOW FORECASTS VERSUS OBSERVED STREAMFLOW

How well did the streamflow forecasts perform last year? The following table is a comparison of the actual 1998 April-July streamflow volumes based on provisional data and the five Exceedance Forecasts for April 1, 1998. The April 1 forecasts, 50% Chance of Exceeding (Most Probable Volume), were below the observed runoff volumes. In some basins, the runoff volumes were even greater than the 10% Chance Exceedance Forecast. The occurrence of observed runoff in the tail of the probability distribution is a result of the unusually wet and record breaking precipitation amounts that fell in May and early June.

In a year like 1998 when record high precipitation amounts fell during the critical snowmelt time, users need to review all five corresponding forecasts to the level of risk they are willing to assume and adjust their operations accordingly.

To illustrate the unusually wet spring precipitation amounts, the following paragraphs are taken from the PRECIPITATION Summary in the JUNE 1, 1998, Idaho Water Supply Outlook Report:

> May brought a tremendous amount of precipitation to Idaho. Precipitation amounts ranged from 3-10 inches across the state. Average May precipitation is 1-6 inches across the state. Some stations received 3-4 times their normal May precipitation amounts. In the later half of the month, the jet stream was directly over Idaho traveling from south to north across the state. May mountainous precipitation amounts ranged from 140% of average in the Clearwater and upper Snake basins to 270% in the central and southwest river basins. Cumulative precipitation since the water year started improved across the state by 5-10 percent from last month and now ranges from 86% of average in the Clearwater basin to 110% in the southern Idaho.
>
> The highest monthly amounts were in the 7-10 inch range in the Weiser, Payette and Boise basins. Many high elevation SNOTEL measuring stations across the state set new records for the greatest May precipitation amounts since the stations were installed about 16 years ago. Long-term National Weather Service valley stations in the Boise and Payette basins also set new records. *May 26, 24-hour precipitation totals for some northern Idaho and west central NWS stations were in the 1-3 inch range and set new 24-hour precipitation totals for the month of May.*

Review of the 1998 Streamflow Forecasts VerssusObserved Streamflow

Basin / Forecast Point	Provisional 1998 Streamflow Data April-July (1000KAF)	April-July Average (1000KAF)	April-July Percent of Average	April 1 1998, Streamflow Forecasts Chance of Exceeding * as Percent of Average 90%	70%	50%	30%	10%
Panhandle Region								
ST. JOE AT CALDER	898	1169	**77**	50	59	**65**	71	78
Clearwater Basin								
DWORSHAK INFLOW	****	****	****	48	60	**65**	70	82
CLEARWATER AT OROFINO	4064	4718	**86**	46	64	**73**	81	100
CLEARWATER AT SPALDING	6111	7618	**80**	48	64	**71**	79	95
NF CLEARWATER AT C.R.S	1371	1727	**79**	****	****	****	****	****
SELWAY NR LOWELL	1872	2114	**89**	****	****	****	****	****
LOCHSA NR LOWELL	1371	1581	**87**	****	****	****	****	****
Salmon Basin								
SALMON AT SALMON	916	869	**105**	48	73	**84**	95	120
SALMON AT WHITE BIRD	5950	5956	**100**	66	73	**84**	95	113
Weiser, Payette & Boise Basins								
WEISER NR WEISER	619	386	**160**	41	72	**87**	101	132
S. F. PAYETTE AT LOWMAN	407	431	**94**	70	78	**84**	89	97
DEADWOOD RESVOIR INFLO	131	136	**97**	75	87	**92**	97	109
N. F. PAYETTE AT CASCADE	619	498	**124**	68	84	**91**	99	115
PAYETTE NR HORSESHOE	1808	1618	**112**	69	82	**88**	94	107
BOISE NR TWIN SPRING	670	631	**106**	70	81	**86**	91	102
S. F. BOISE AT ANDERSON	591	545	**109**	63	73	**78**	83	94
BOISE NR BOISE	1566	1421	**110**	69	78	**82**	87	96
Wood & Lost River Basins								
BIG WOOD AT HAILEY	324	255	**127**	53	66	**73**	80	96
BIG WOOD NEAR BELLEVUE	340	183	**185**	43	54	**62**	71	85
CAMAS CREEK NEAR BLAINE	144	102	**141**	60	70	**78**	87	99
LITTLE WOOD NR CAREY	137	92	**150**	64	77	**87**	97	110
BIG LOST AT HOWELL RANC	204	181	**112**	63	76	**84**	93	105
LITTLE LOST BLW WET CK	38	31	**122**	64	77	**88**	97	110
Upper Snake River Basin								
HENRYS FORK NR ASHTON	698	544	**128**	83	92	**97**	103	111
TETON NEAR DRIGGS	198	152	**130**	82	95	**105**	114	127
TETON NR ST. ANTHONY	455	380	**120**	81	94	**102**	111	124
SNAKE NR MORAN (WY)	893	781	**114**	79	90	**95**	100	111
SNAKE AT HEISE	3839	3451	**111**	83	90	**95**	100	107
Southside Snake River Basins								
OAKLEY RESERVOIR INFLOW	38	28	**136**	54	69	**82**	93	114
SALMON FALLS CREEK	30	80	**120**	46	63	**74**	86	108
BRUNEAU NR HOT SPRINGS	254	209	**121**	52	69	**81**	95	117
OWYHEE NR GOLD CK (NV)	30	25	**119**	34	55	**71**	88	120
OWYHEE RESV. INFLOW	683	390	**175**	41	55	**65**	77	95

**** Not forecast or not available.

* 90%, 70%, 50%, 30% and 10% chance of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

Note: The Most Probable Forecast is listed under the 50% Chance of Exceeding Forecast and is in bold.

Streamflow Adjustment List For All Forecasts Published In Idaho Basin Outlook Report Streamflow forecasts are projections of runoff volumes that would have occurred naturally without influences from upstream reservoirs or diversions. These values are referred to as natural or adjusted flows. To make these adjustments, changes in reservoir storage, diversions, and inter-basin transfers are added or subtracted from the observed (actual) streamflow volumes. The following list documents the adjustments made to each forecast point in this report. (Revised October 1998)

Panhandle River Basins
KOOTENAI R AT LEONIA, ID
+ LAKE KOOCANUSA (STORAGE CHANGE)
CLARK FORK AT WHITEHORSE RAPIDS, ID
+ HUNGRY HORSE (STORAGE CHANGE)
+ FLATHEAD LAKE (STORAGE CHANGE)
+ NOXON RAPIDS RESV (STORAGE CHANGE)
PEND OREILLE LAKE INFLOW, ID
+ PEND OREILLE R AT NEWPORT, WA
+ HUNGRY HORSE (STORAGE CHANGE)
+ FLATHEAD LAKE (STORAGE CHANGE)
+ NOXON RAPIDS (STORAGE CHANGE
+ PEND OREILLE LAKE (STORAGE CHANGE)
PRIEST R NR PRIEST R, ID
+ PRIEST LAKE (STORAGE CHANGE)
COEUR D'ALENE R AT ENAVILLE, ID - No Corrections
ST. JOE R AT CALDER, ID - No Corrections
SPOKANE R NR POST FALLS, ID
+ COEUR D'ALENE LAKE (STORAGE CHANGE)
SPOKANE R AT LONG LAKE, WA
+ COEUR D'ALENE LAKE (STORAGE CHANGE)
+ LONG LAKE, WA (STORAGE CHANGE)

Clearwater River Basin
DWORSHAK RESERVOIR INFLOW, ID
+ DWORSHAK RESV (STORAGE CHANGE)
- CLEARWATER R AT OROFINO, ID
+ CLEARWATER R NR PECK, ID
CLEARWATER R AT OROFINO, ID - No Corrections
CLEARWATER R AT SPALDING, ID
+ DWORSHAK RESV (STORAGE CHANGE)

Salmon River Basin
SALMON R AT SALMON, ID - No Corrections
SALMON R AT WHITE BIRD, ID - No Corrections

Weiser, Payette, Boise River Basins
WEISER R NR WEISER, ID - No Corrections
SF PAYETTE R AT LOWMAN, ID - No Corrections
DEADWOOD RESERVOIR INFLOW, ID
+ DEADWOOD R BLW DEADWOOD RESV NR LOWMAN
+ DEADWOOD RESV (STORAGE CHANGE)
NF PAYETTE R AT CASCADE, ID
+ CASCADE RESV (STORAGE CHANGE)
NF PAYETTE R NR BANKS, ID
+ CASCADE RESV (STORAGE CHANGE)
PAYETTE R NR HORSESHOE BEND, ID
+ DEADWOOD RESV (STORAGE CHANGE)
+ CASCADE RESV (STORAGE CHANGE)
BOISE R NR TWIN SPRINGS, ID - No Corrections
SF BOISE R AT ANDERSON RANCH DAM, ID
+ ANDERSON RANCH RESV (STORAGE CHANGE)
BOISE R NR BOISE, ID
+ ANDERSON RANCH RESV (STORAGE CHANGE)
+ ARROWROCK RESV (STORAGE CHANGE)
+ LUCKY PEAK RESV (STORAGE CHANGE)

Wood and Lost River Basins
BIG WOOD R AT HAILEY, ID - No Corrections
BIG WOOD R NR BELLEVUE, ID - No Corrections
BIG WOOD R BLW MAGIC DAM NR RICHFIELD, ID
+ MAGIC RESV (STORAGE CHANGE)
LITTLE WOOD R NR CAREY, ID
+ LITTLE WOOD RESV (STORAGE CHANGE)
BIG LOST R AT HOWELL RANCH NR CHILLY, ID - No Corrections
BIG LOST R BLW MACKAY RESV NR MACKAY, ID
+ MACKAY RESV (STORAGE CHANGE)
LITTLE LOST R BLW WET CK NR HOWE, ID - No Corrections
LITTLE LOST R NR HOWE, ID (Disc) - No Corrections

Upper Snake River Basin
HENRYS FORK NR ASHTON, ID
+ HENRYS LAKE (STORAGE CHANGE)
+ ISLAND PARK RESV (STORAGE CHANGE)
HENRYS FORK NR REXBURG, ID
+ HENRYS LAKE (STORAGE CHANGE)
+ ISLAND PARK RESV (STORAGE CHANGE)
+ DIV FM HENRYS FK BTW ASHTON & ST. ANTHONY, ID
+ DIV FM HENRYS FK BTW ST. ANTHONY & REXBURG, ID
+ GRASSY LAKE (STORAGE CHANGE)
FALLS R ABV YELLOWSTONE CANAL NR SQUIRREL, ID
+ GRASSY LAKE (STORAGE CHANGE)
TETON R ABV SO LEIGH CK NR DRIGGS, ID - No Corrections
TETON R NR ST. ANTHONY, ID
- CROSS CUT CANAL
+ SUM OF DIVERSIONS ABV GAGE
SNAKE R NR MORAN, WY
+ JACKSON LAKE (STORAGE CHANGE)
PALISADES RESERVOIR INFLOW, ID
+ SNAKE R NR IRWIN, ID
+ JACKSON LAKE (STORAGE CHANGE)
+ PALISADES RESV (STORAGE CHANGE)
SNAKE R NR HEISE, ID
+ JACKSON LAKE (STORAGE CHANGE)
+ PALISADES RESV (STORAGE CHANGE)

SNAKE R NR BLACKFOOT, ID
+ PALISADES RESV (STORAGE CHANGE)
+ JACKSON LAKE (STORAGE CHANGE)
+ DIV FM SNAKE R BTW HEISE AND SHELLY GAGES
+ DIV FM SNAKE R BTW SHELLY AND BLACKFT, ID
PORTNEUF R AT TOPAZ, ID - No Corrections
AMERICAN FALLS RESERVOIR INFLOW, ID
+ ALL CORRECT MADE FOR HENRYS FK NR REXBURG, ID
+ JACKSON LAKE (STORAGE CHANGE)
+ PALISADES RESV (STORAGE CHANGE)
+ DIV FM SNAKE R BTW HEISE AND SHELLY GAGES
+ DIV FM SNAKE R BTW SHELLY AND BLACKFT GAGES

Southside Snake River Basins
OAKLEY RESERVOIR INFLOW, ID
+ GOOSE CK ABV TRAPPER CK NR OAKLEY, ID
+ TRAPPER CK NR OAKLEY, ID
SALMON FALLS CK NR SAN JACINTO, NV - No Corrections
BRUNEAU R NR HOT SPRINGS, ID - No Corrections
OWYHEE R NR GOLD CK, NV
+ WILDHORSE RESV (STORAGE CHANGE)
OWYHEE R NR OWYHEE, NV
+ WILDHORSE RESV (STORAGE CHANGE)
OWYHEE R NR ROME, OR
+ WILDHORSE RESV (STORAGE CHANGE)
+ JORDAN VALLEY RESV (STORAGE CHANGE)
OWYHEE RESERVOIR INFLOW, OR
+ OWYHEE R BLW OWYHEE DAM, OR
+ OWYHEE RESV (STORAGE CHANGE)
+ DIV TO NORTH AND SOUTH CANALS
SUCCOR CK NR JORDAN VALLEY, OR - No Corrections
SNAKE R - KING HILL, ID - No Corrections
SNAKE R NR MURPHY, ID - No Corrections
SNAKE R AT WEISER, ID - No Corrections
SNAKE R AT HELLS CANYON DAM, ID
+ BROWNLEE RESV (STORAGE CHANGE)

Bear River Basin
BEAR R NR RANDOLPH, UT
+ SULPHUR CK RESV (STORAGE CHANGE)
+ CHAPMAN CANAL DIVERSION
+ WOODRUFF NARROWS RESV (STORAGE CHANGE)
SMITHS FORK NR BORDER, WY - No Corrections
THOMAS FORK NR WY-ID STATELINE - No Corrections
BEAR R BLW STEWART DAM, ID
+ SULPHUR CK RESV (STORAGE CHANGE)
+ CHAPMAN CANAL DIVERSION
+ WOODRUFF NARROWS RESV (STORAGE CHANGE)
+ DINGLE INLET CANAL
+ RAINBOW INLET CANAL
MONTPELIER CK AT IRR WEIR NR MONTPELIER, ID (Disc)
+ MONTPELIER CK RESV (STORAGE CHANGE)
CUB R NR PRESTON, ID - No Corrections

RESERVOIR CAPACITY DEFINITIONS (Units in 1000 acre-feet, KAF)

Different agencies use various definitions when reporting reservoir capacity and contents. Reservoir storage terms include dead, inactive, active, and surcharge storage. The table below lists these volumes for each reservoir in this report, and defines the storage volumes that NRCS uses when reporting capacity and current reservoir storage. In most cases, NRCS reports usable storage, which includes active and inactive storage.

BASIN/ RESERVOIR	DEAD STORAGE	INACTIVE STORAGE	ACTIVE STORAGE	SURCHARGE STORAGE	NRCS CAPACITY	NRCS CAPACITY INCLUDES
PANHANDLE REGION						
HUNGRY HORSE	39.73	--	3451.00	--	3451.0	ACTIVE
FLATHEAD LAKE	Unknown	--	1791.00	--	1971.0	ACTIVE
NOXON RAPIDS	Unknown	--	335.00	--	335.0	ACTIVE
PEND OREILLE	406.20	112.40	1042.70	--	1561.3	DEAD+INACTIVE+ACTIVE
COEUR D'ALENE	--	13.50	225.00	--	238.5	INACTIVE+ACTIVE
PRIEST LAKE	20.00	28.00	71.30	--	119.3	DEAD+INACTIVE+ACTIVE
CLEARWATER BASIN						
DWORSHAK	--	1452.00	2016.00	--	3468.0	INACTIVE+ACTIVE
WEISER/BOISE/PAYETTE BASINS						
MANN CREEK	1.61	0.24	11.10	--	11.1	ACTIVE
CASCADE	--	50.00	653.20	--	703.2	INACTIVE+ACTIVE
DEADWOOD	1.50	--	161.90	--	161.9	ACTIVE
ANDERSON RANCH	29.00	41.00	423.18	--	464.2	INACTIVE+ACTIVE
ARROWROCK	--	--	286.60	--	286.6	ACTIVE
LUCKY PEAK	--	28.80	264.40	13.80	293.2	INACTIVE+ACTIVE
LAKE LOWELL	--	8.00	169.10	--	177.1	INACTIVE+ACTIVE
WOOD/LOST BASINS						
MAGIC	--	--	191.50	--	191.5	ACTIVE
LITTLE WOOD	--	--	30.00	--	30.0	ACTIVE
MACKAY	0.13	--	44.37	--	44.4	ACTIVE
UPPER SNAKE BASIN						
HENRYS LAKE	--	--	90.40	--	90.4	ACTIVE
ISLAND PARK	0.40	--	127.30	7.90	135.2	ACTIVE+SURCHARGE
GRASSY LAKE	--	--	15.18	--	15.2	ACTIVE
JACKSON LAKE	--	--	847.00	--	847.0	ACTIVE
PALISADES	44.10	155.50	1200.00	--	1400.0	DEAD+INACTIVE+ACTIVE
RIRIE	4.00	6.00	80.54	10.00	80.5	ACTIVE
BLACKFOOT	--	--	348.73	--	348.7	ACTIVE
AMERICAN FALLS	--	--	1672.60	--	1672.6	ACTIVE
SOUTHSIDE SNAKE BASINS						
OAKLEY	--	--	74.50	--	77.4	ACTIVE
SALMON FALLS	48.00	--	182.65	--	182.6	ACTIVE
WILDHORSE	--	--	71.50	--	71.5	ACTIVE
OWYHEE	406.83	--	715.00	--	715.0	ACTIVE
BROWNLEE	0.45	444.00	975.30	--	1419.3	INACTIVE+ACTIVE
BEAR RIVER BASIN						
WOODRUFF NARROWS	--	1.50	57.30	--	57.3	ACTIVE
WOODRUFF CREEK	--	4.00	4.00	--	4.0	ACTIVE
BEAR LAKE	--	--	1421.00	--	1421.0	ACTIVE
MONTPELIER CREEK	0.21	--	3.84	--	4.0	DEAD+ACTIVE

Interpreting Streamflow Forecasts

Introduction
Each month, five forecasts are issued for each forecast point and each forecast period Unless otherwise specified, all streamflows are for streamflow volumes that would occur naturally without any upstream influences Water users need to know what the different forecasts represent if they are to use the information correctly when making operational decisions The following is an explanation of each of the forecasts

Most Probable (50 Percent Chance of Exceeding) Forecast. This forecast is the best estimate of streamflow volume that can be produced given current conditions and based on the outcome of similar past situations There is a 50 percent chance that the streamflow volume will exceed this forecast value There is a 50 percent chance that the streamflow volume will be less than this forecast value

The most probable forecast will rarely be exactly right, due to errors resulting from future weather conditions and the forecast equation itself. This does not mean that users should not use the most probable forecast: it means that they need to evaluate existing cirumstances and determine the amount of risk they are willing to take by accepting this forecast value.

To Decrease the Chance of Having Too Little Water
If users want to make sure there is enough water available for their operations, they might determine that a 50 percent chance of the streamflow volume being lower than the most probable forecast is too much risk to take. To reduce the risk of not having enough water available during the forecast period, users can base their operational decisions on one of the forecasts with a greater chance of being exceeded (or possibly some point in-between). These include:

70 Percent Chance of Exceeding Forecast. There is a 70 percent chance that the streamflow volume will exceed this forecast value There is a 30 percent chance the streamflow volume will be less than this forecast value

90 Percent Chance of Exceeding Forecast. There is a 90 percent chance that the streamflow volume will exceed this forecast value. There is a 10 percent chance the streamflow volume will be less than this forecast value

To Decrease the Chance of Having Too Much Water
If users want to make sure they don't have too much water, they might determine that a 50 percent chance of the streamflow being higher than the most probable forecast is too much of a risk to take. To reduce the risk of having too much water available during the forecast period, users can base their operational decisions on one of the forecasts with a smaller chance of being exceeded These include.

30 Percent Chance of Exceeding Forecast. There is a 30 percent chance that the streamflow volume will exceed this forecast value There is a 70 percent chance the streamflow volume will be less than this forecast value

10 Percent Chance of Exceeding Forecast. There is a 10 percent chance that the streamflow volume will exceed this forecast value. There is a 90 percent chance the streamflow volume will be less than this forecast value

Using the forecasts - an example

Using the Most Probable Forecast. Using the example forecasts shown below, users can reasonably expect 36,000 acre-feet to flow past the gaging station on the Mary's River newa Deeth between March 1 and July 31

Using the Higher Exceedance Forecasts. If users anticipate a somewhat drier trend in the future (monthly and seasonal weather outlooks are available from the National Weather Service every two weeks), or if they are operating at a level where an unexpected shortage of water could cause problems, they might want to plan on receiving only 20,000 acre-feet (from the 70 percent chance of exceeding forecast) In seven out of ten years with similar conditions, streamflow volumes will exceed the 20,000 acre-foot forecast

If users anticipate extremely dry conditions for the remainder of the season, or if they detrmine the risk of using the 70 percent chance of exceeding forecast is too great, then they might plan on receiving only 5000 acre-feet (from the 90 percent chance of exceeding forecast). Nine out of ten years with similar conditions, streamflow volumes will exceed the 5000 acre-foot forecast

Using the Lower Exceedance Forecasts. If users expect wetter future conditions, or if the chance that five out of every ten years with similar conditions would produce streamflow volumes greater that 36,000 acre-feet was more than they would like to risk, they might plan on receiveing 52,000 acre-feet (from the 30 percent chance of exceeding forecast) to minimize potential flooding problems Three out of ten years with similar conditions, streamflows will exceed the 52,000 acre-foot forecast

In years when users expect extremely wet conditions for the remainder of the season and the threat of severe flooding and downstream damage exists, they might choose to use the 76,000 acre-foot (10 percent chance of exceeding) forecast for their water management operations Streamflow volumes will exceed this level only one year out of ten

UPPER HUMBOLDT RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	DRIER 90% (1000AF)	70% (1000AF)	FUTURE CONDITIONS — Chance of Exceeding 50% (Most Probable) (1000AF)	(% AVG)	WETTER 30% (1000AF)	10% (1000AF)	25 YR (1000AF)
MARY'S RIVER nr Deeth	MAR-JUL	5.0	20.0	36	77	52	76	47
	APR-JUL	8.0	17.0	31	74	45	67	42
LAMOILLE CREEK nr Lamoille	MAR-JUL	6.0	16.0	24	79	32	43	31
	APR-JUL	4.0	15.0	22	75	30	41	30
NR HUMBOLDT RIVER at Devils Gate	MAR-JUL	6.0	12.0	43	73	74	121	59

For more information concerning streamflow forecasting ask your local NRCS field office for a copy of "A Field Office Guide for Interpreting Streamflow Forecasts"

AN EQUAL OPPORTUNITY EMPLOYER

U.S. DEPARTMENT of AGRICULTURE

CONSERVATION OF WATER
BEGINS WITH THE
SNOW SURVEY

USDA, Natural Resources Conservation Service
9173 West Barnes Drive, Suite C
Boise ID 83709-1754

OFFICIAL BUSINESS

NATIONAL AGRICULTURAL LIBRARY
SERIAL RECORDS ROOM 002
10301 BALTIMORE BLVD
BELTSVILLE MD 20705-2351

Issued by

Pearlie S. Reed
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

Luana E. Kiger
State Conservationist
Natural Resources Conservation Service
Boise, Idaho

Prepared by

Snow Survey Staff
Ron T. Abramovich, Water Supply Specialist
Philip S. Morrisey, Hydrologist
Bill J. Patterson, Electronics Technician
Jeff Graham, Electronics Technician